1.1-1.4 Review Key

Name _____ Period _____ Date _____

Simplify each expression by adding, subtracting or multiplying. Show work!

1. $(3x^2-4x+1)+(2x^3+x^2-x-4)$

$3x^2-4x+1+2x^3+x^2-x-4$

$2x^3+4x^2-5x-3$

2. $(-x^2-4x-2)-(2x^3+3x^2-x-1)$

$-x^2-4x-2-2x^3-3x^2+x+1$

$-2x^3-4x^2-3x-1$

3. $(4x-3)(x^3+3x^2-x-1)$

$4x^4+12x^3-4x^2-4x$
$-3x^3-9x^2+3x+3$

$4x^4+9x^3-13x^2-x+3$

4. $(x+5)(2x-1)-(3x^2-16x+3)$

$2x^2-x+10x-5-3x^2+16x-3$

$-x^2+25x-8$

Multiply the expression using the polynomial identities. Show work!

5. $(3x+2y)^2$ $A=3x$ $B=2y$ (perfect square)

$(3x)^2+2(3x)(2y)+(2y)^2$

$9x^2+12xy+4y^2$

6. $(x-2y)^3$ (cubic) $A=x$ $B=-2y$

$(x)^3+3(x)^2(-2y)+3(x)(-2y)^2+(-2y)^3$

$x^3-6x^2y+12xy^2-8y^3$

7. $(x-4)(x+6)$

$x^2+(-4+6)x+(-4)(6)$

$x^2+2x-24$

8. $(5x+i)(5x-i)$ $A=5x$ $B=1$ Sum of squares

$(5x)^2+(1)^2=25x^2+1$

Factor the expressions using the polynomial identities. Show work!

9. $16x^2-49$ (diff. of squares)

$A=4x$ $B=7$

$(4x+7)(4x-7)$

10. x^3+125 (Sum of cubes) $A=x$, $b=5$

$(x+5)(x^2-5x+25)$

11. $x^2-4x-21$ 21 $7,3$

$(x-7)(x+3)$

12. $9x^2+81$ G.C.F.(9) Sum of squares $A=x$ $B=3$

$9(x^2+9)$

$9(x+3i)(x-3i)$

must show work for each!

13. **Given x^3-3x^2-x+3, use the Remainder Theorem to determine which of the following is a factor? Show work!**

a) $x+3$ $f(-3) = (-3)^3-3(-3)^2-(-3)+3 = -27-27+3+3 = -48$ (no)

b) $x-3$ $f(3) = (3)^3-3(3)^2-(3)+3 = 27-27-3+3 = 0$ yes

c) $x+1$ $f(-1) = (-1)^3-3(-1)^2-(-1)+3 = -1-3+1+3 = 0$ yes

14. **Given $2x^3+x^2-5x+2$, use the Remainder Theorem to determine which of the following is a factor? Show work!**

a) $x+3$ $f(-3) = 2(-3)^3+(-3)^2-5(-3)+2 = -54+9+15+2 = -28$ no

b) $x-1$ $f(1) = 2(1)^3+(1)^2-5(1)+2 = 2+1-5+2 = 0$ yes

c) $x+2$ $f(-2) = 2(-2)^3+(-2)^2-5(-2)+2 = -16+4+10+2 = 0$ yes

Describe the end behavior of each polynomial using limits.

15. $f(x)=(x+3)(x-1)(2x-5)$

$\lim_{x\to-\infty} f(x) = -\infty$ $\lim_{x\to+\infty} f(x) = \infty$

16. $f(x)=-(x+4)^2(x-2)$

$\lim_{x\to-\infty} f(x) = \infty$ $\lim_{x\to+\infty} f(x) = -\infty$

17. $f(x)=-2x^3-3x^2+36x-58$

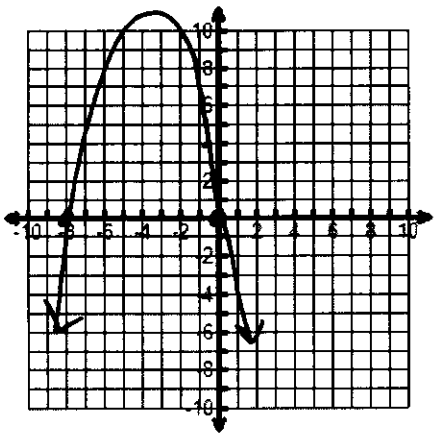
$\lim_{x\to-\infty} f(x) = \infty$ $\lim_{x\to+\infty} f(x) = -\infty$

18. $f(x)=3x^4-7x^3+16x^2-15x+65$

$\lim_{x\to-\infty} f(x) = \infty$ $\lim_{x\to+\infty} f(x) = \infty$

State the degree and list the zeros of the polynomial. State the multiplicity of each zero and determine whether the graph crosses or touches the *x*-axis at the corresponding *x*-intercept. Then sketch a graph.

19. $f(x)=-2x^3(x+8)$ Degree: 4

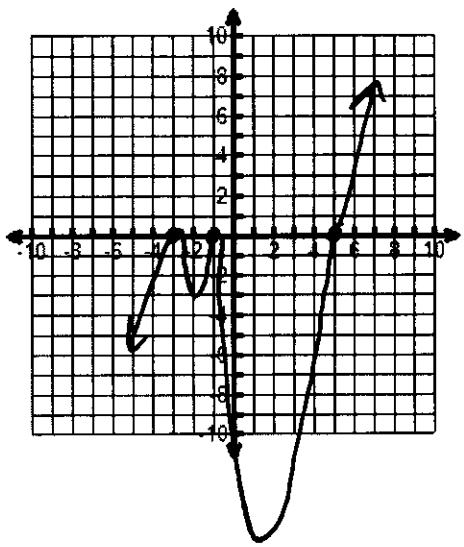


Zero	Multiplicity	Touch/Cross
x=0	3	Cross
x=-8	1	Cross

$\lim_{x\to-\infty} f(x)=-\infty$ $\lim_{x\to+\infty} f(x)=-\infty$

y-int: (0,0)

20. $f(x)=(x+1)^2(x-5)^3(x+3)^2$ Degree: 7



Zero	Multiplicity	Touch/Cross
x=-1	2	Touch
x=5	3	Cross
x=-3	2	Touch

$\lim_{x\to-\infty} f(x)=-\infty$ $\lim_{x\to+\infty} f(x)=\infty$

y-int: (0,-1125)

21. Graph the given polynomial function using a graphing calculator and then find the following:

$f(x)=-x^3+3x^2+x-3$ **Zeros** (write as ordered pairs): (-1, 0), (1, 0), (3, 0)

***y*-intercept** (write as an ordered pair): (0, -3)

End Behavior: $\lim_{x\to-\infty} f(x)=\infty$ $\lim_{x\to+\infty} f(x)=-\infty$